

The Bureau of Ocean Energy Management: Mapping the Outer Continental Shelf

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Bureau of Ocean Energy Management

NOAA Nautical Cartography Open House
Silver Spring, Maryland

7/27/2018

Outline

- * Introduction
 - * BOEM
 - * The U.S. Offshore Cadastre
 - * History and challenge of maintenance
- * Building the Boundary Delineation System
 - * Background
 - * Contract with Esri, Inc.
 - * Progress to date
 - * Future mapping

Who is BOEM?



- * **Bureau of Ocean Energy Management** is the bureau within DOI responsible for the exploration and development of energy and marine mineral resources on the Outer Continental Shelf (OCS).
- * **Minerals Management Service**
1982 - 2010
- * **Bureau of Ocean Energy Management, Regulation and Enforcement**
2010 - 2011

BOEM, BSEE, and ONRR (since 2011)



- * **Bureau of Ocean Energy Management (BOEM)**
- * **Bureau of Safety and Environmental Enforcement (BSEE)**
- * **Office of Natural Resources Revenue (ONRR)**

Authority: Submerged Lands Act

- * Passed by Congress in 1953
- * Granted title to the natural resources located within **three nautical miles of a coastal state** (nine nautical miles for Texas and the Gulf Coast of Florida – also Puerto Rico).
- * SLA boundary is projected seaward from officially recognized baseline points, and bay closing lines, along the **mean lower low water line** of the coast line.

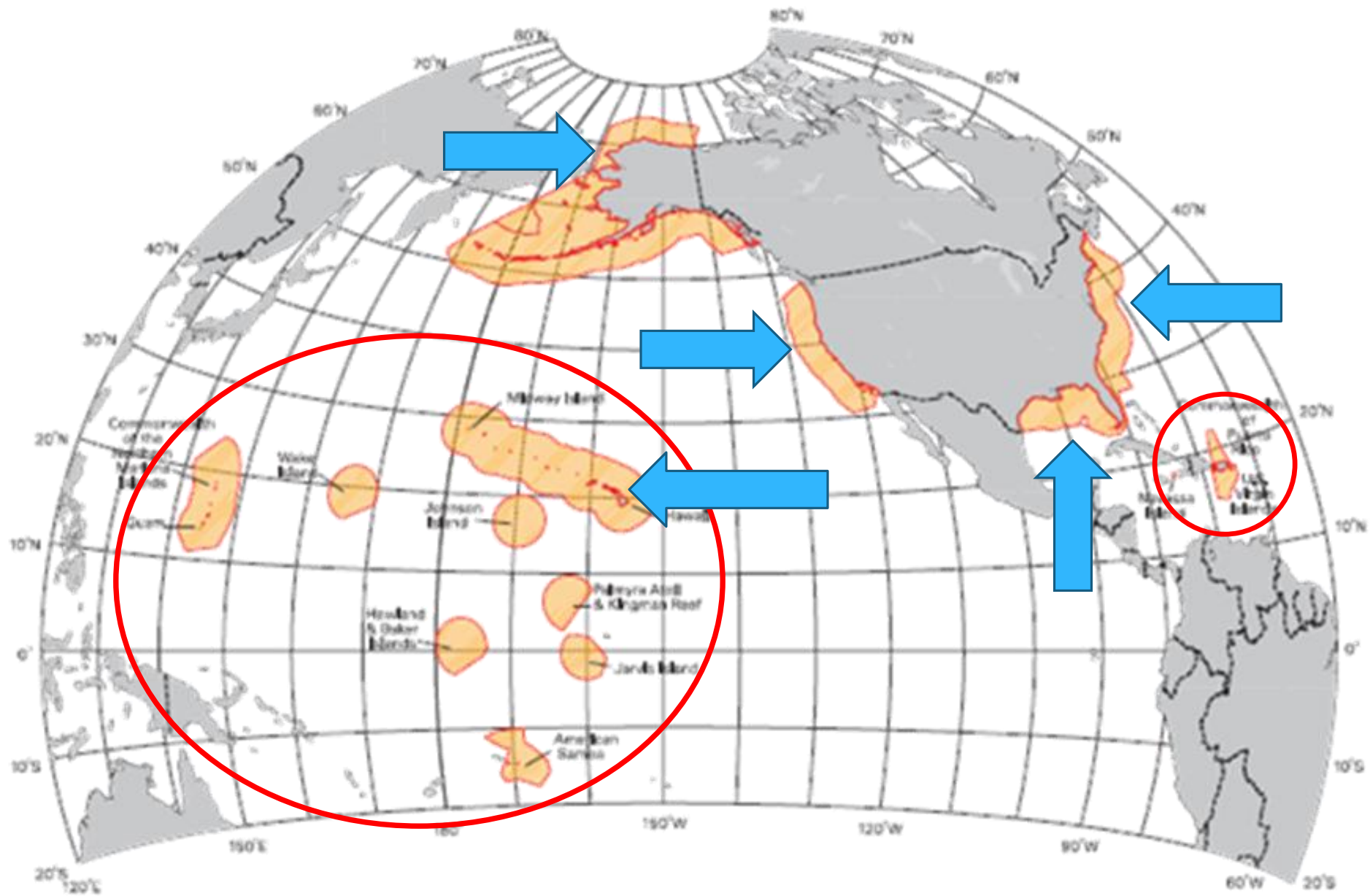
Authority: Outer Continental Shelf Lands Act

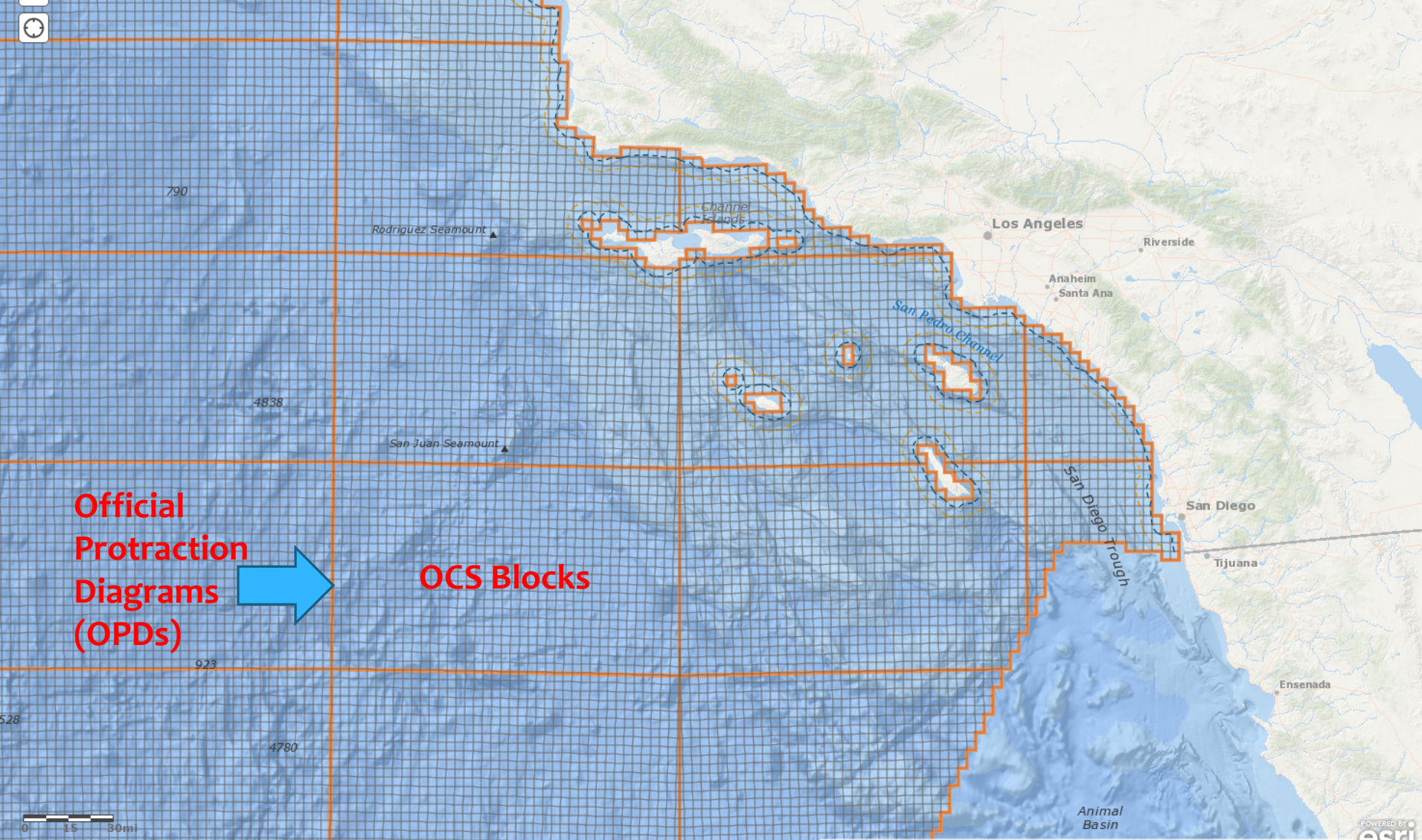
Outer Continental Shelf Lands Act of 1953:

*“... **all submerged lands lying seaward and outside of the area of lands beneath navigable waters**... and of which the subsoil and seabed appertain to the United States and are subject to its jurisdiction and control.”*

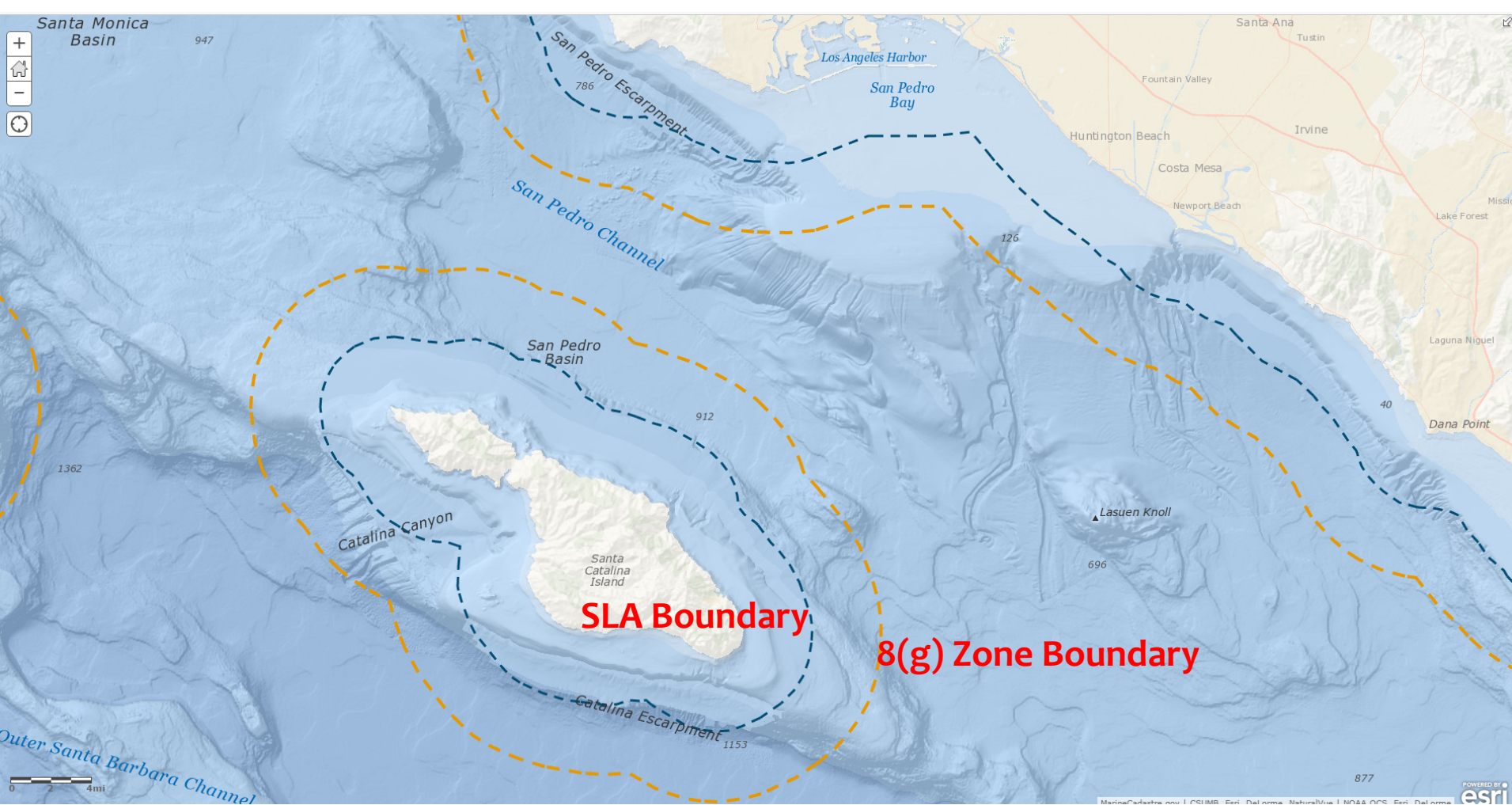
The U.S. Offshore Cadastre

- * Federal jurisdiction extends from the **Submerged Lands Act boundary** to the full extent of the **Outer Continental Shelf**
 - * **Exclusive Economic Zone boundary** (200 nautical miles)
 - * **International Boundaries**
- * Includes the block grids and official boundaries
- * Enables BOEM to *define, describe, analyze, and account for every acre/hectare of federal offshore submerged land.*



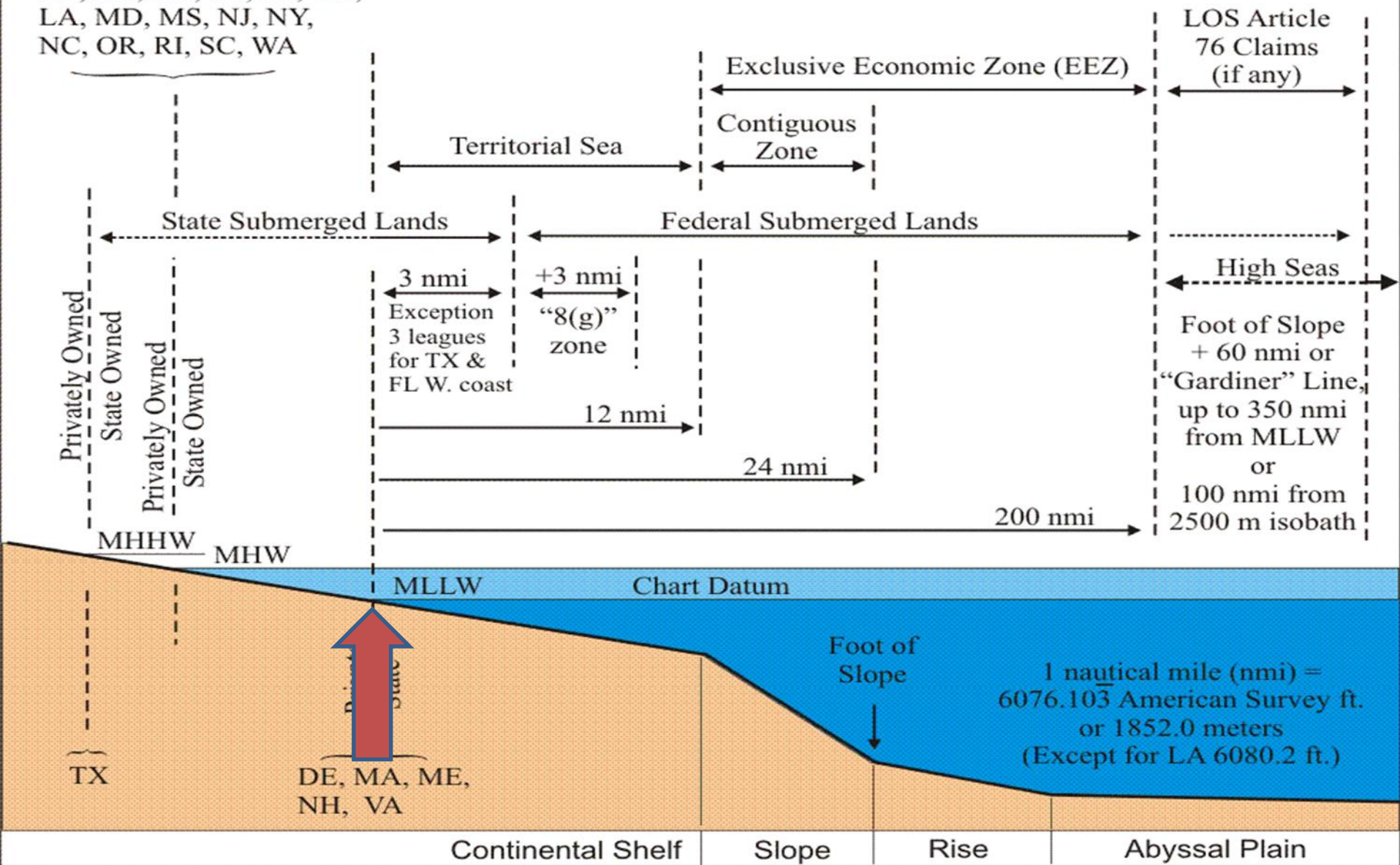


The **Offshore Cadastre** includes the block grids and official boundaries, which provide the base for nearly all of the BOEM offshore maps and leasing processes.

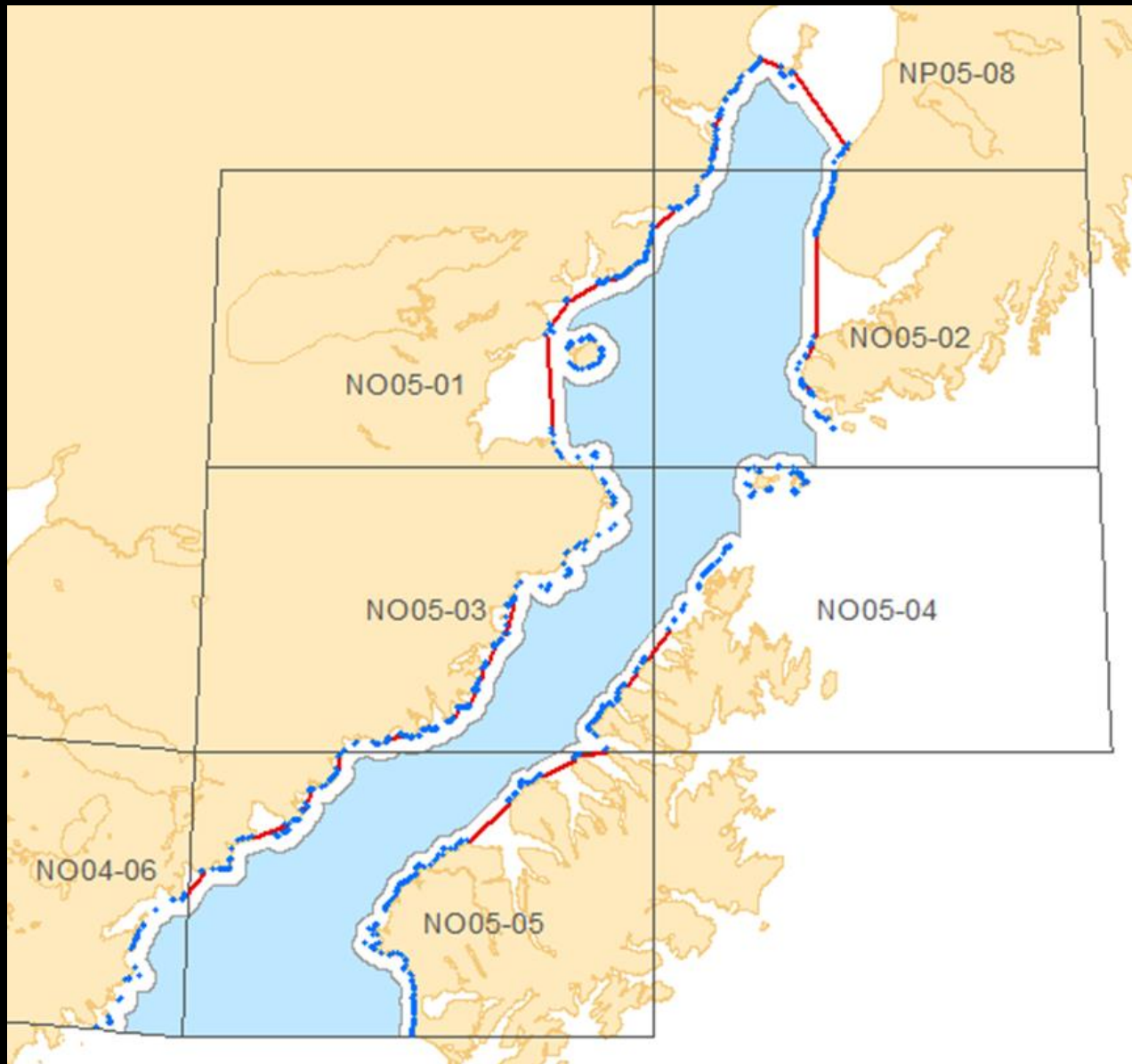


The **Offshore Cadastre** includes the block grids and official boundaries, which provide the base for nearly all of the BOEM offshore maps and leasing processes.

AL, AK, CA, CT, FL, GA,
LA, MD, MS, NJ, NY,
NC, OR, RI, SC, WA

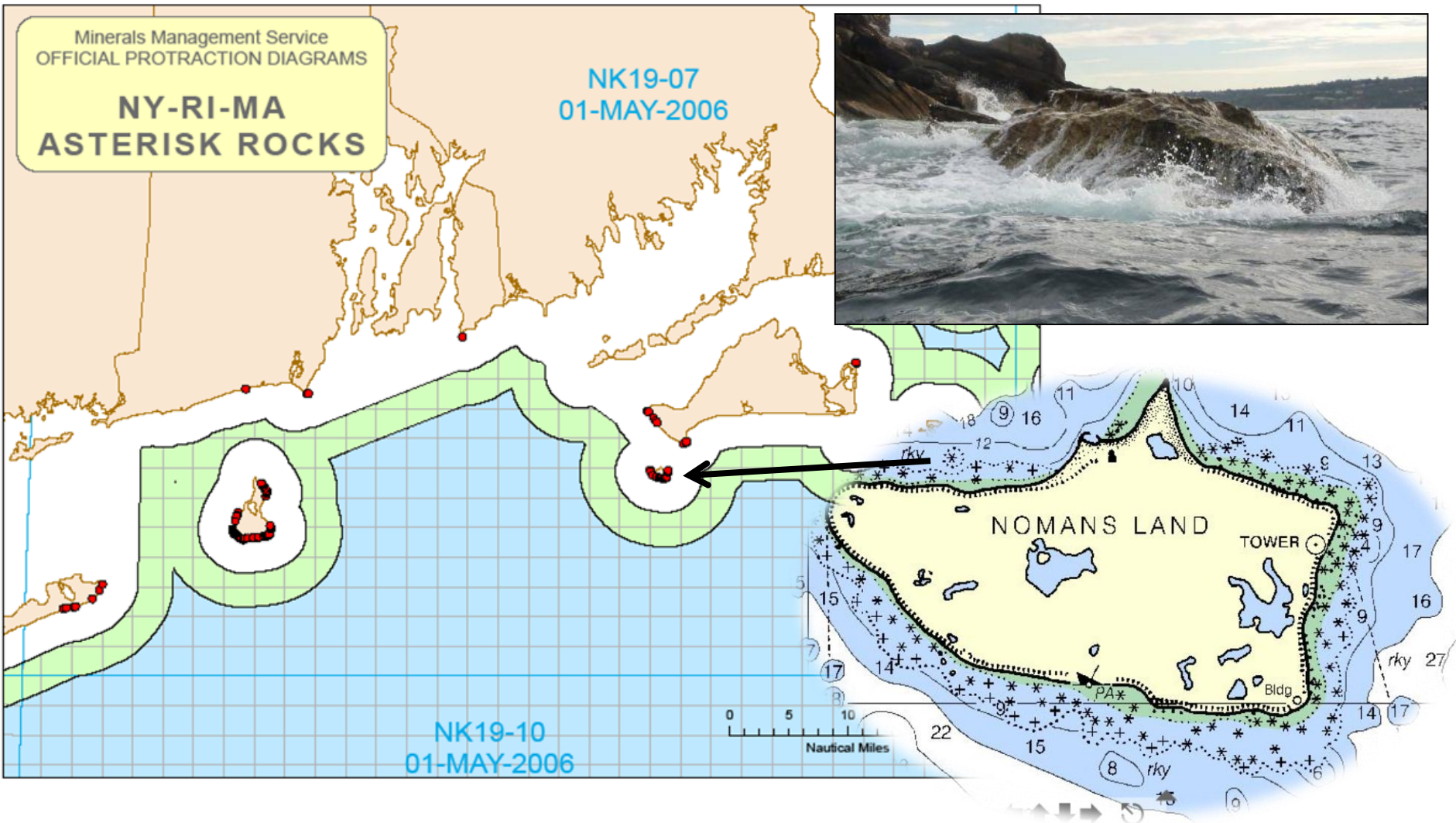


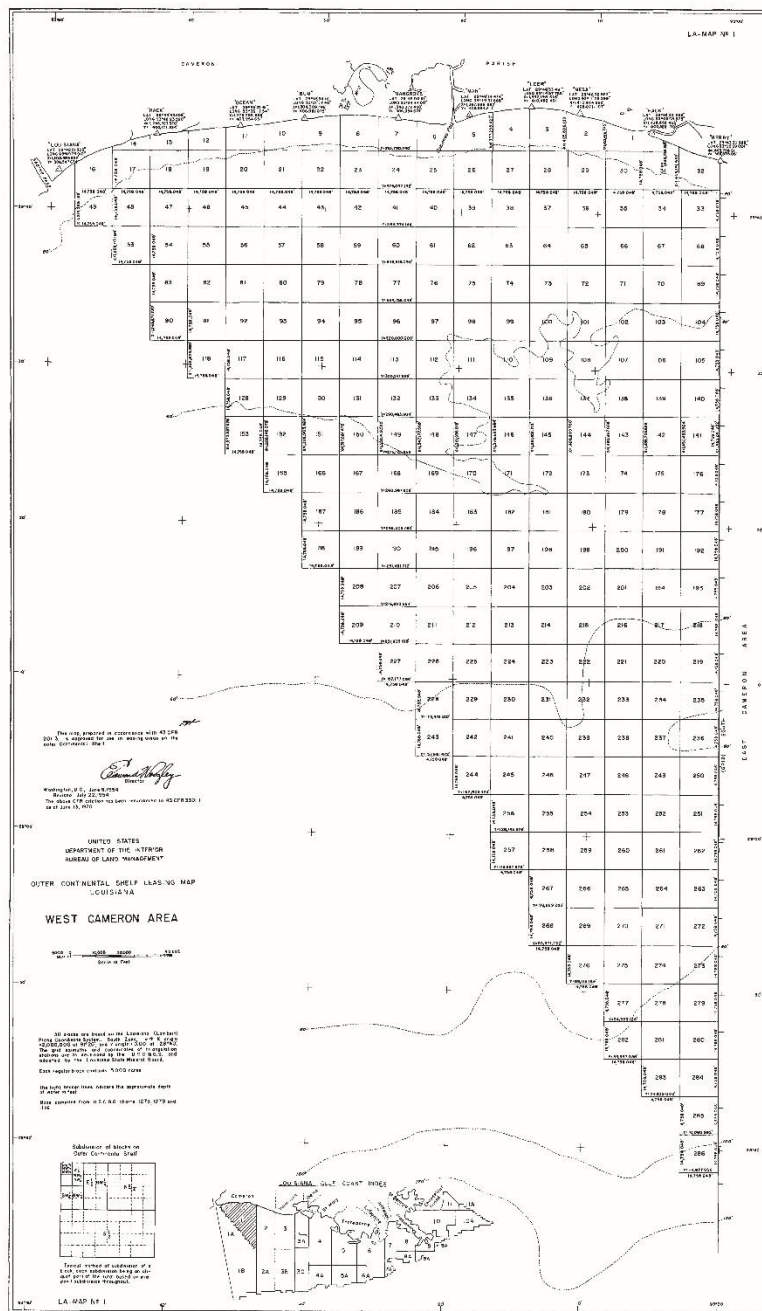
BOEM uses the Mean Lower Low Water line as generated by NOAA and approved by the U.S. Baseline Committee



Baseline and SLA Boundary, Upper Cook Inlet, Alaska

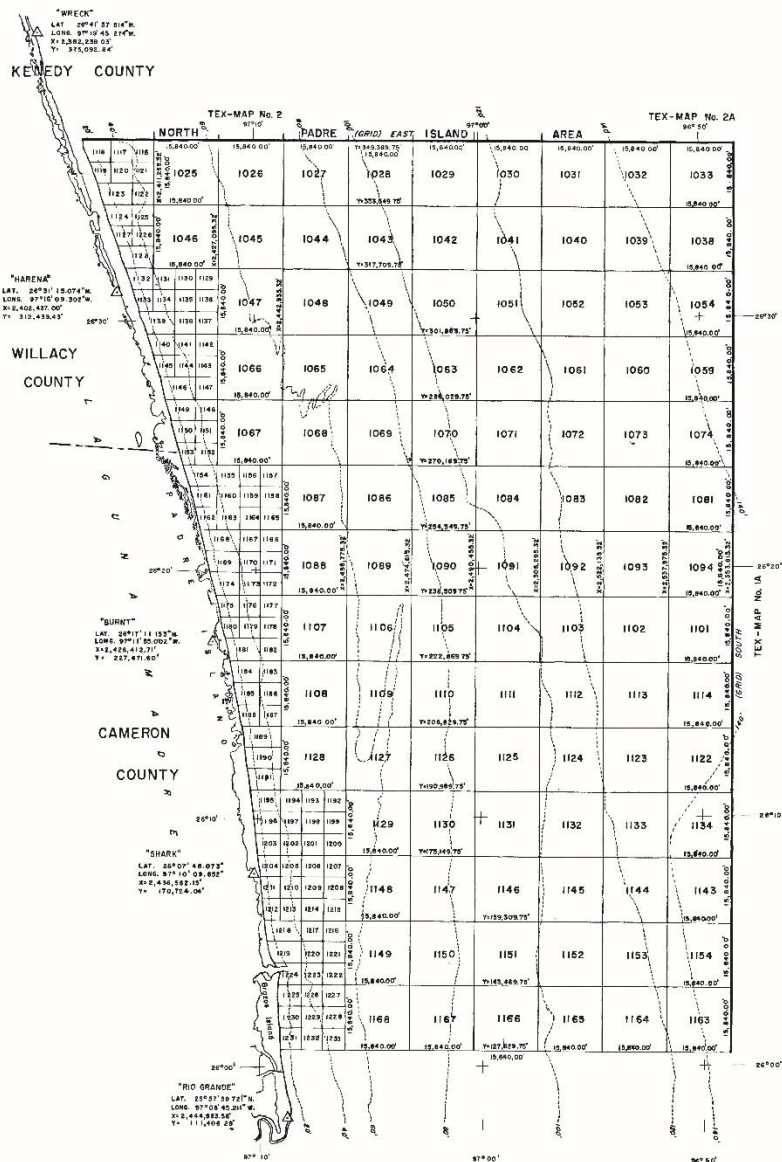
Asterisk Rocks – Rocks Awash (MLLW)





1954 –
Bureau of
Land Management
creates first
Leasing Maps

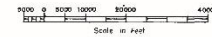
West Cameron Area, LA



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

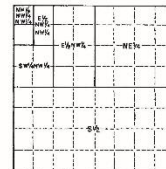
OUTER CONTINENTAL SHELF LEASING MAP
TEXAS

SOUTH PADRE ISLAND AREA

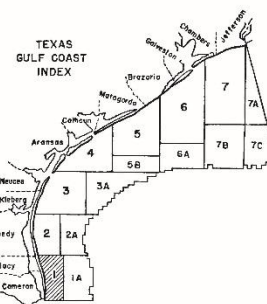


All blocks are based on the Texas (Lambert) Plane Coordinate System, South Zone with X origin = 2,000,000 and Y origin = 0.00 at 23° 40'. The grid latitude and coordinates of triangulation stations are as developed by the U.S.C. & G.S. and adopted by the General Land Office of Texas. Each large block contains 2,760 acres, and each regular small block 640 acres. The areas of the irregular small blocks along the shore are not shown herein. The light broken lines indicate the approximate depth of water in feet. Shore line taken from U.S.C. & G.S. charts 1267 & 1268.

Subdivision of blocks on
Outer Continental Shelf



Typical method of subdivision of the blocks, each subdivision being an equal part of the total, based on mid-point subdivision throughout



This map, prepared in accordance with 43 CFR 201.3, is approved for use in leasing areas on the Outer Continental Shelf.

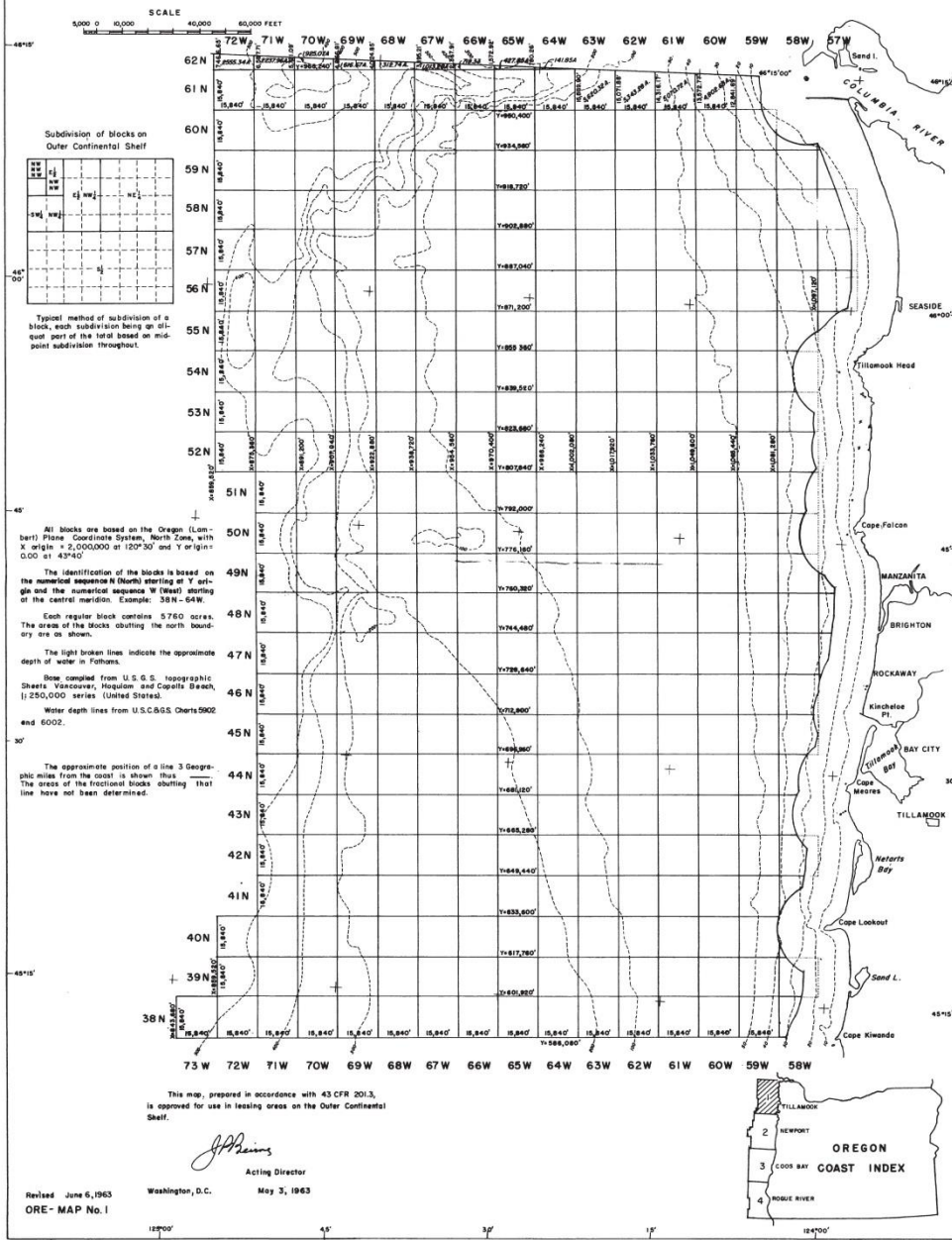
W. L. Williams
Williams, D. C., July 16, 1954
The above CFR citation has been renumbered to 43 CFR 330.1 as of June 15, 1970.

State Plane Coordinate System

Blocks contain 5000 acres

South Padre Island Area, TX

TILLAMOOK AREA
MAP No. 1



1963 –
First Leasing Maps
with the
Submerged Lands Act
Boundary

Tillamook Area, OR

Computer Mapping Software – 1970 (evolved into *TIMS Block and Boundary Tools*)

- * Based on FORTRAN programming language code
- * Block grid is mathematically generated
- * SLA boundary is mathematically projected from points along the coast line

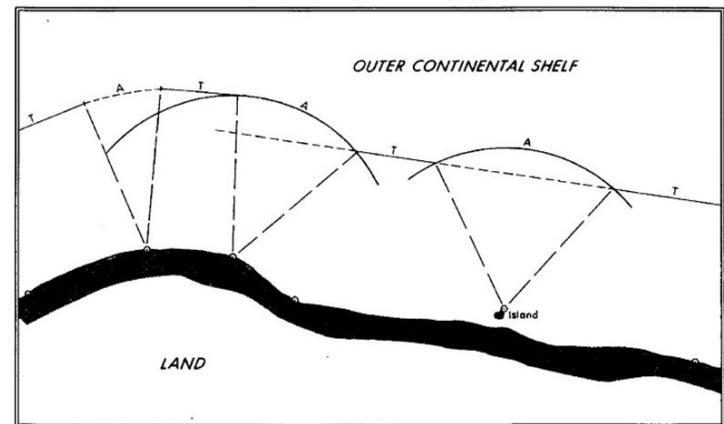


Figure 5 Curve intersecting a straight line.

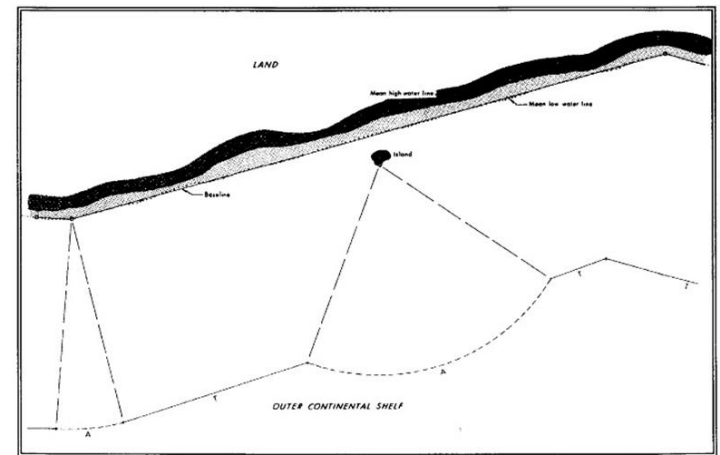
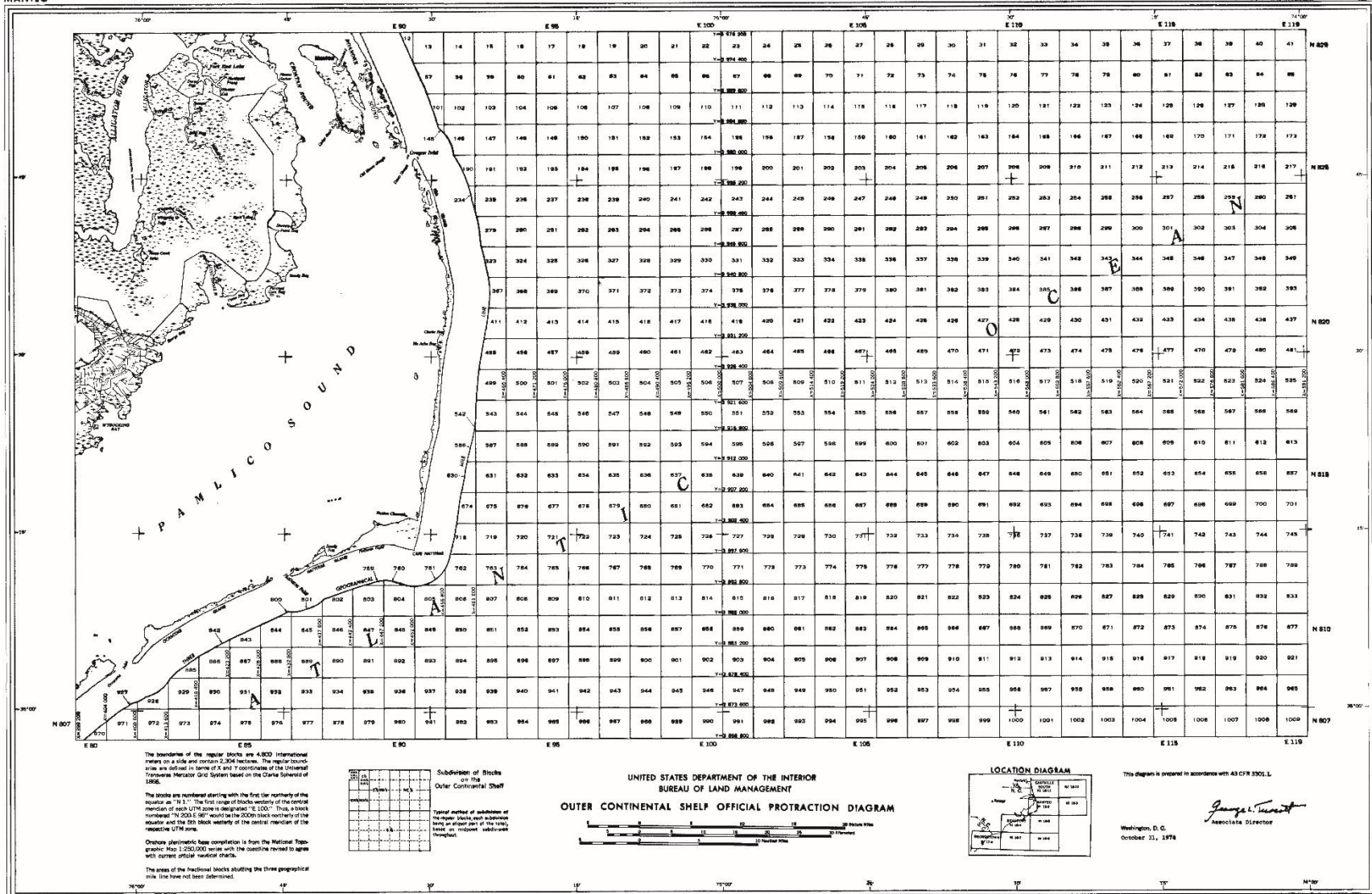


Figure 6 Tangent intersected by a superimposed arc.

Official Protraction Diagram - 1972

- * UTM grid
- * Blocks are increased to 5760 acres (nine square miles)
- * Measure 1° in latitude by 2° in longitude south of 48° latitude; increase to 3° in longitude north of 48°
- * Printed at 1:250,000 scale (name coincident with USGS 1:250's)



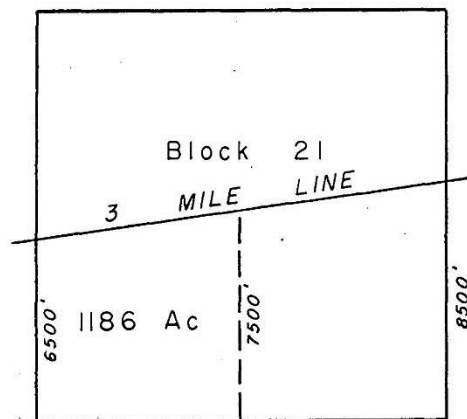
Official Protraction Diagram

Manteo, NC - 1972

WEST CAMERON AREA

Lease Block crossed by the
3 Mile Line.

August 2, 1962



*CIA
Halt*

**Lease Block
Diagram - 1962**

West Cameron Area, LA

*see Department of Public Works letter
of August 16, 1962*

O.C.S. 9187 La.

DISC PAK NO.

FILE NO.

UNITED STATES DEPARTMENT OF INTERIOR

~~BUREAU OF LAND MANAGEMENT~~

MINERALS MANAGEMENT SERVICE

SUPPLEMENTAL OFFICIAL

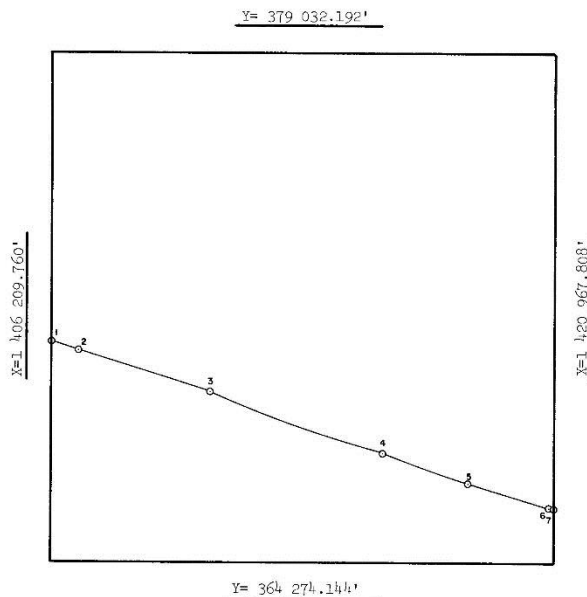
OCS 8-G BLOCK DIAGRAM

OPD NO. LA-MAP 1

BLOCK NO. 36

OCS LEASE NO.

STATE LEASE NO.



INTERSECTIONS

	X	Y
1	1 406 209.76'	370 603.95'
2	1 407 028.95'	370 420.00'
3	1 410 887.20'	369 241.29'
4	1 415 928.43'	367 447.54'
5	1 418 330.47'	366 600.18'
6	1 420 835.47'	365 855.18'
7	1 420 967.81'	365 815.13'

ARC CENTERS

	X	Y
*1-2	1 410 175.00'	407 090.00'
*2-3	1 416 365.00'	405 700.00'
3-4	1 425 600.00'	402 610.00'
4-5	1 429 020.00'	401 485.00'
*5-6	1 429 020.00'	401 485.00'
6-7	1 431 465.00'	400 740.00'

*TANGENT SEGMENT

FEDERAL AREA 1341.35ac

%

STATE AREA

%

8G AREA 3658.65ac

%

COMPUTATIONS BY THU DATE 2-10-83DRAFTED BY JK DATE 1/15/83CHECKED BY THU DATE 2/17/83

FOR THE DIRECTOR

J. L. ThompsonDATE 2/24/83

FOR THE STATE

DATE

Supplemental Official Block Diagram - 1983

West Cameron Area, LA

NAD27 and the Gulf of Mexico

- * Minerals Management Service (MMS) created in 1982
- * 1989: All Federal agencies that perform mapping activities are instructed to **migrate to the North American Datum of 1983 (NAD83)**.
- * 1990: Over 5000 oil and gas leases in the Gulf of Mexico
- * MMS planned to convert all maps from NAD27 to NAD83. **Conversion was completed for all Regions except the Gulf of Mexico.**

Technical Information Management System (TIMS) - 1992

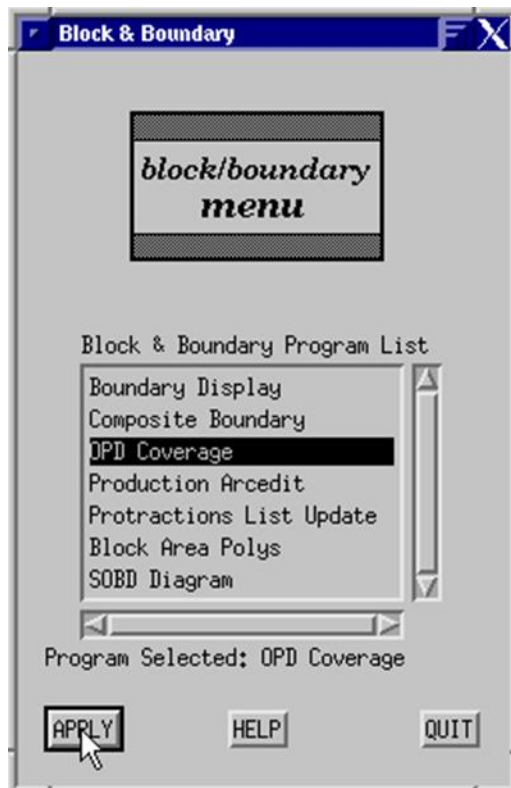


TIMS currently contains all major business functions of BOEM, BSEE, and ONRR (40 separate components)

Block and Boundary component contains tabular data and mapping tools

Block and Boundary data cannot readily be incorporated into a GIS or shared with other bureaus

2014 TIMS Roadmap recommended a GIS solution to replace Block and Boundary tools



TIMS Block and Boundary Mapping Tools

- * **Never been modernized;
expensive to fix or upgrade**
- * **Routine tasks require many steps**
- * **Prone to technical malfunctions**
- * **Unable to project a line seaward beyond 12 nautical miles (to accommodate Congressional proposals in GOMR and ATL)**
- * **Unable to generate blocks and boundaries outside of North America (Hawaii etc.)**

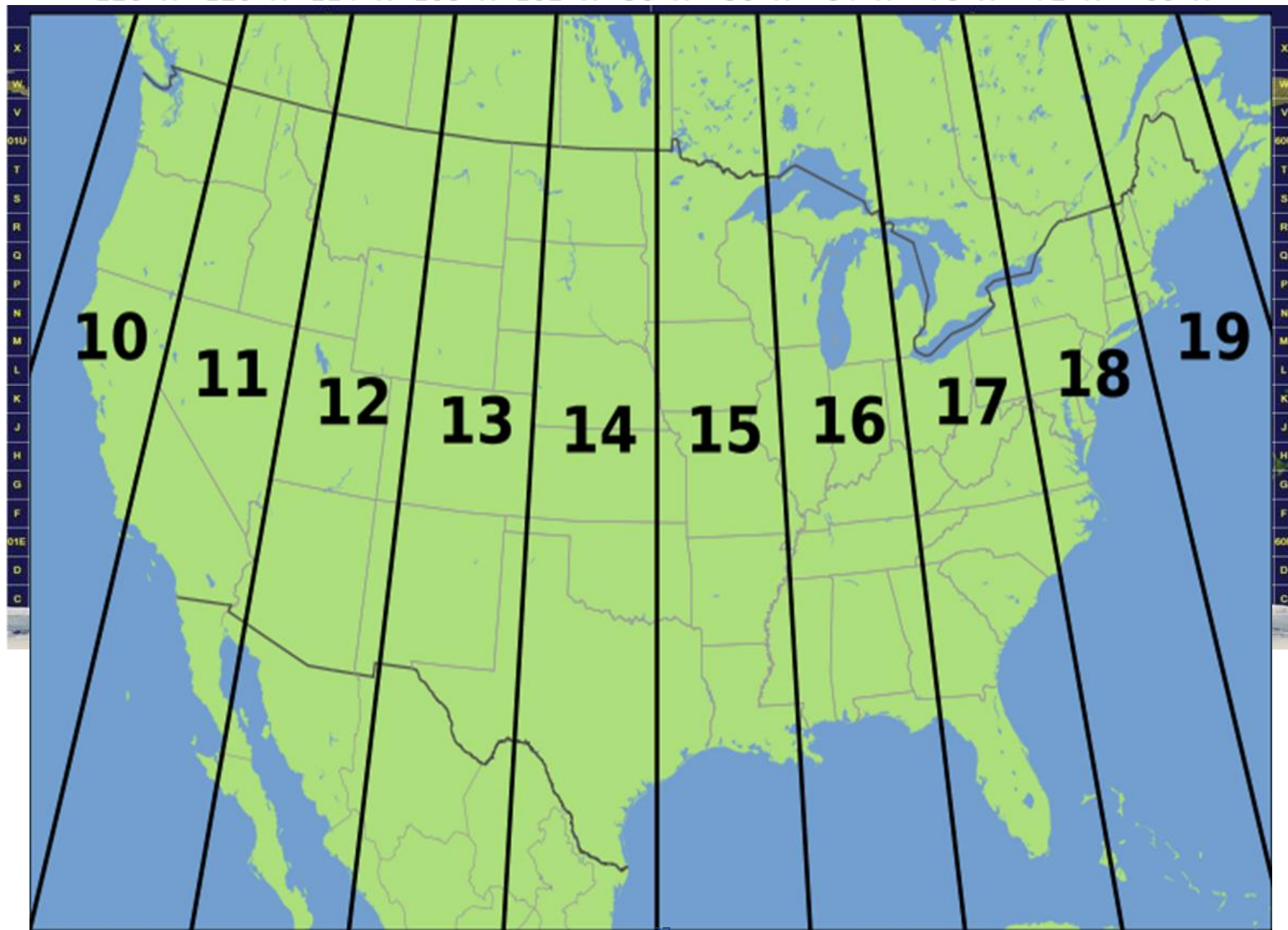
Building a New System - 2007

- * Replace TIMS mapping tools with GIS technology
- * **Custom tools for all processes** (calculations, generate blocks and boundaries)
- * Contracts with Esri, Inc. signed 2007, 2009, and 2010 (Total of \$1.16 million)
- * First set of custom tools delivered in December 2010

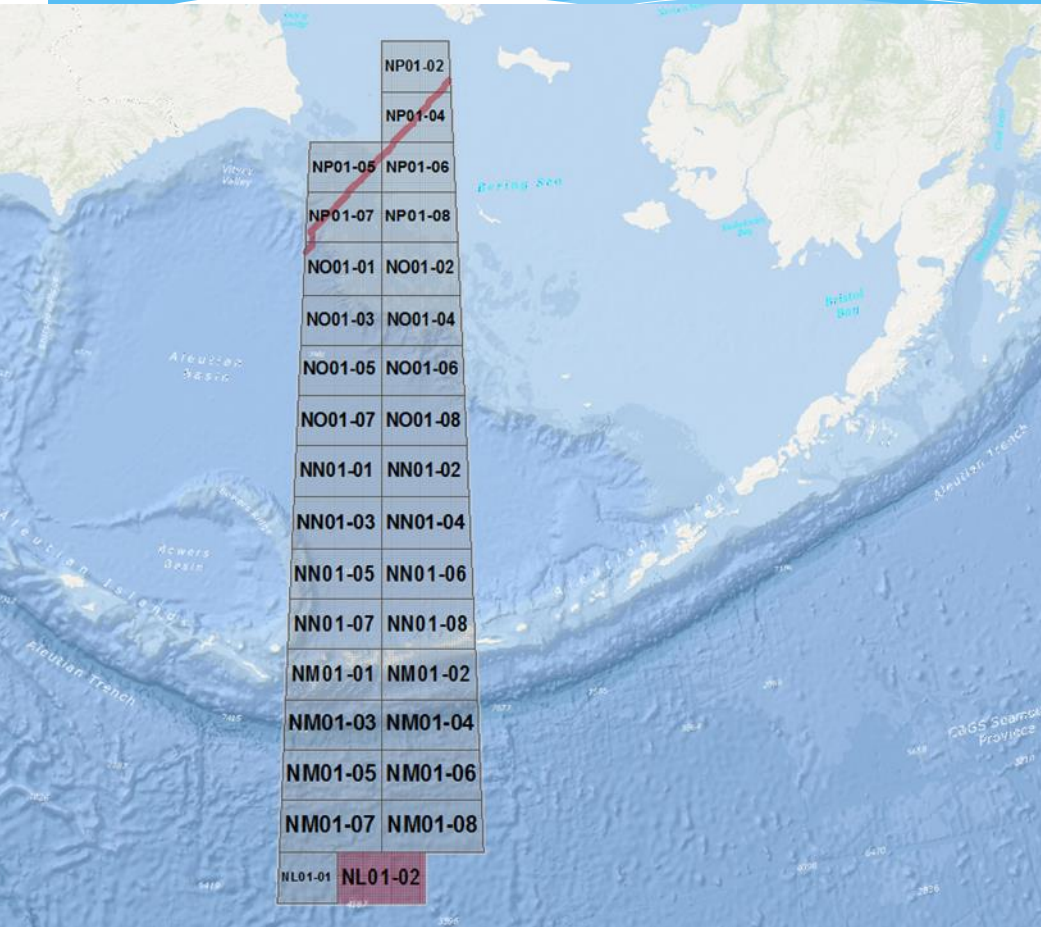
Building the Boundary Delineation System: 2015 - 2018

- * **Current contract with Esri** - utilizes ArcGIS commercial-off-the-shelf (COTS) tools (**no customized tools**)
- * **New Data Model** utilizes **42 separate geodatabases**, which allows for efficient storage and retrieval of all OCS cadastral data. Using the UTM zones provides accurate block areas.
- * **Esri has successfully imported Block and Boundary “active” data from TIMS** into the geodatabases for the all BOEM Regions using the ***Data Interoperability*** extension.
- * **Map Production tools** have been configured to generate OPDs and SOBDs.

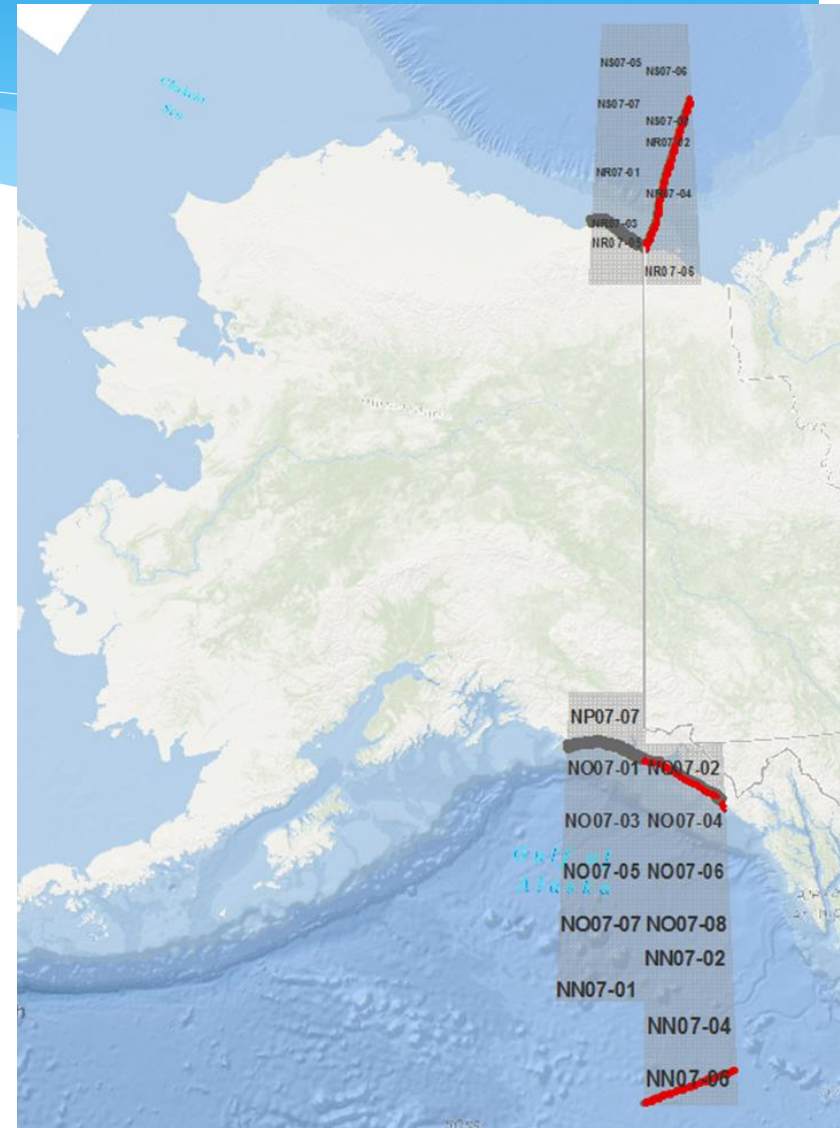
126°W 120°W 114°W 108°W 102°W 96°W 90°W 84°W 78°W 72°W 66°W



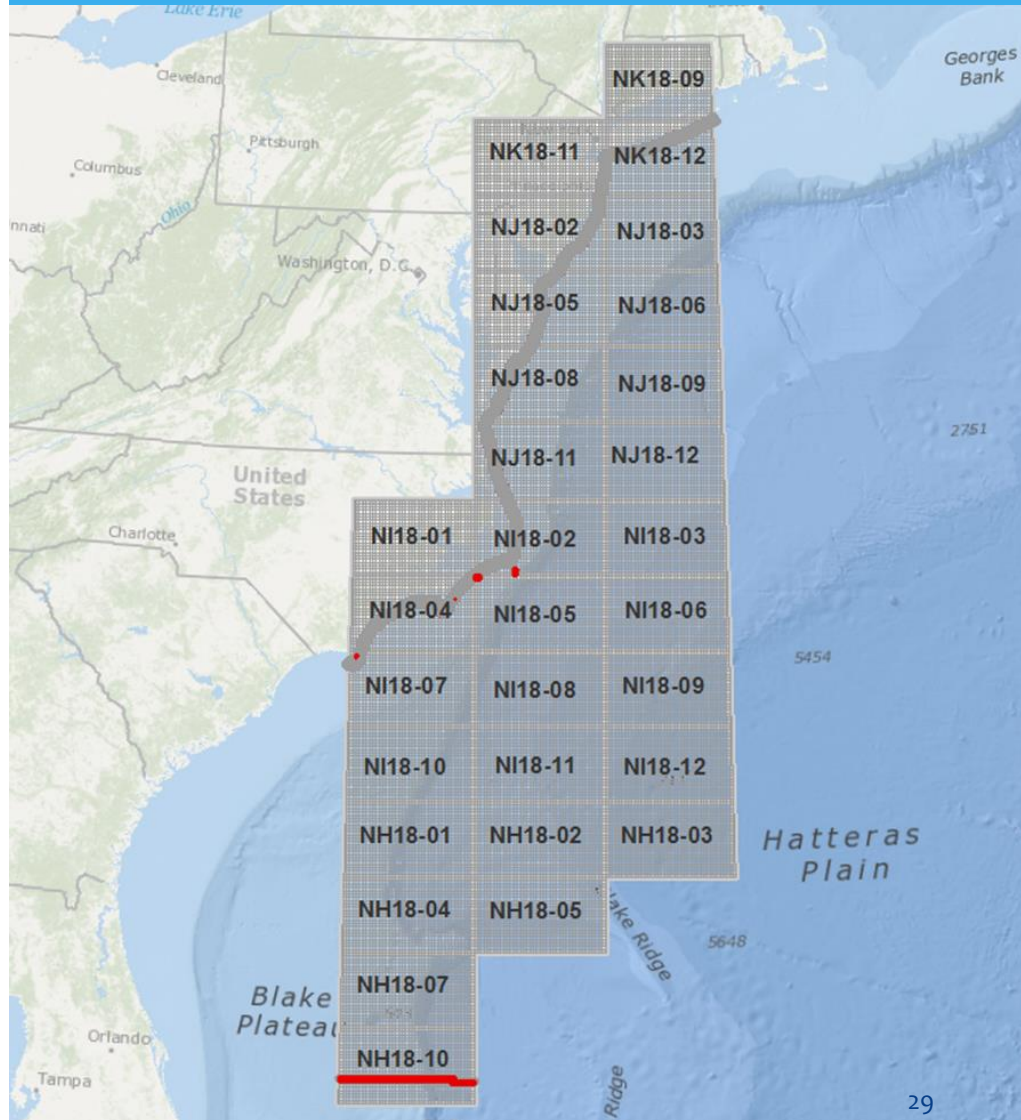
Geodatabase for UTM Zone 1N – Alaska Region



Geodatabase for UTM Zone 7N – Alaska Region

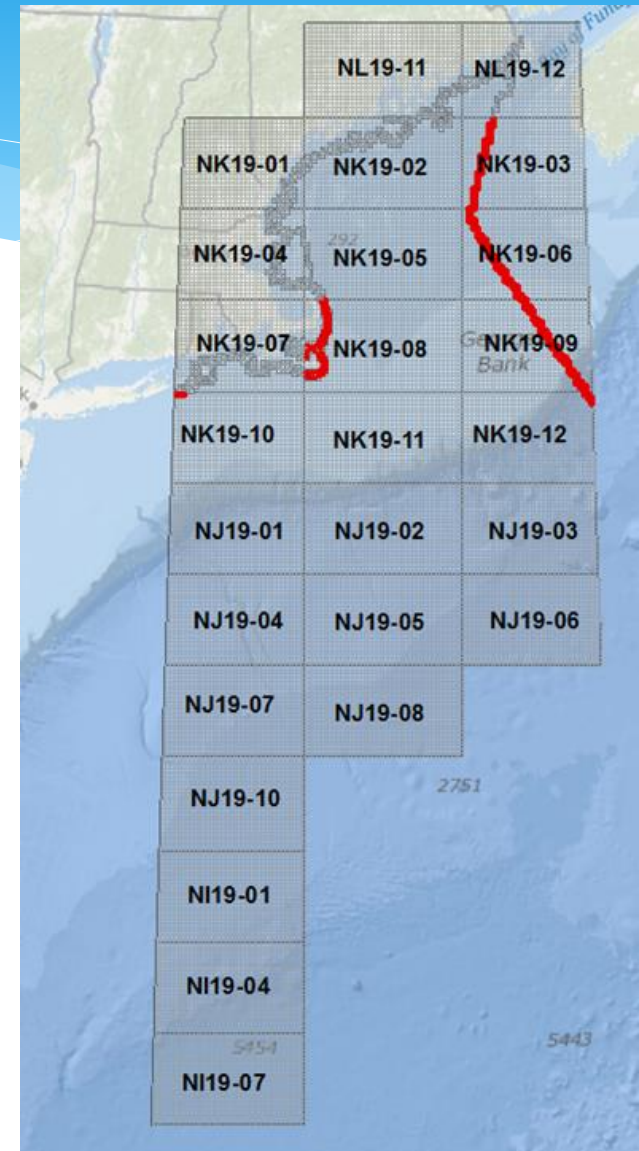


Geodatabase for UTM Zone 18N – Atlantic Region

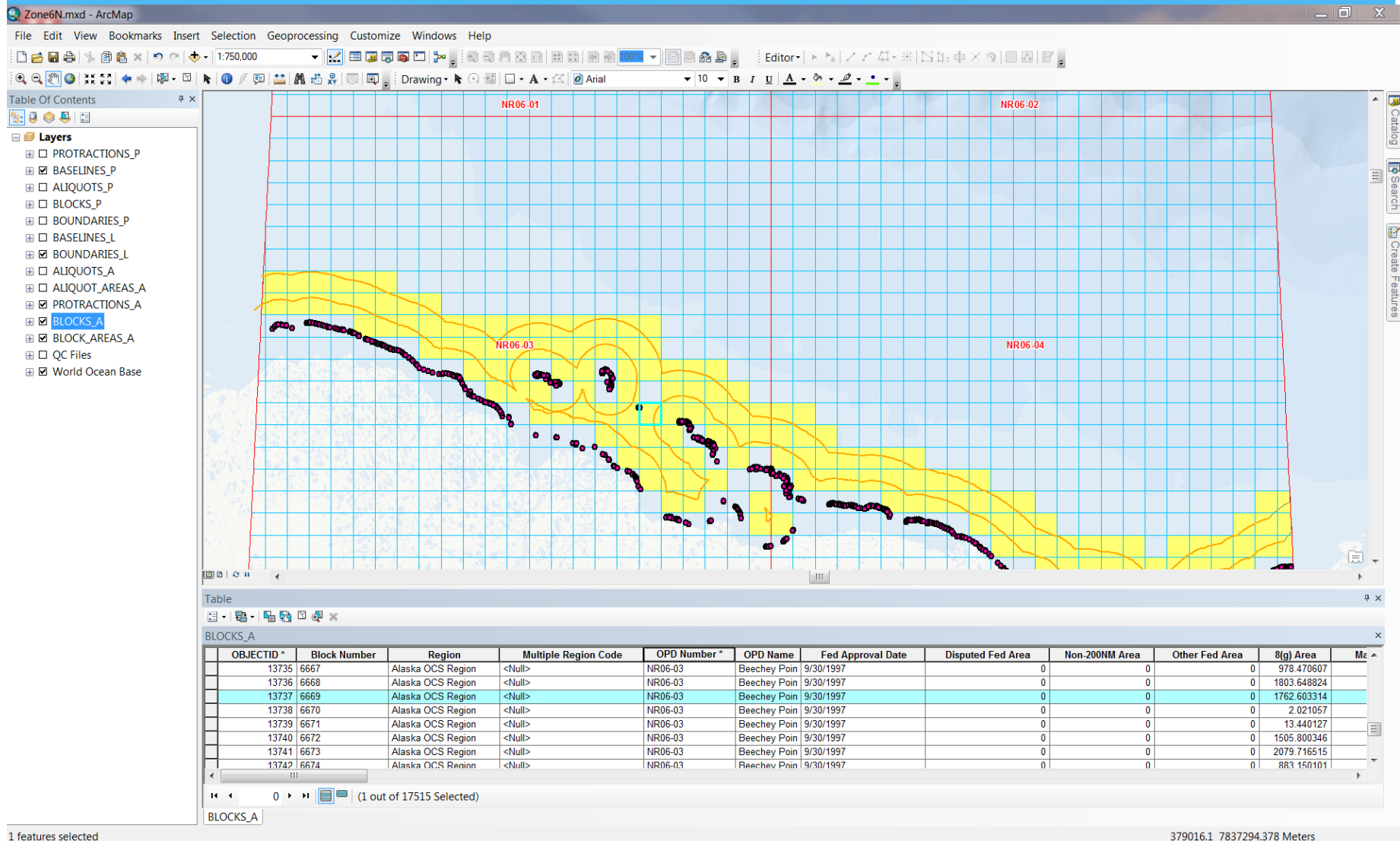


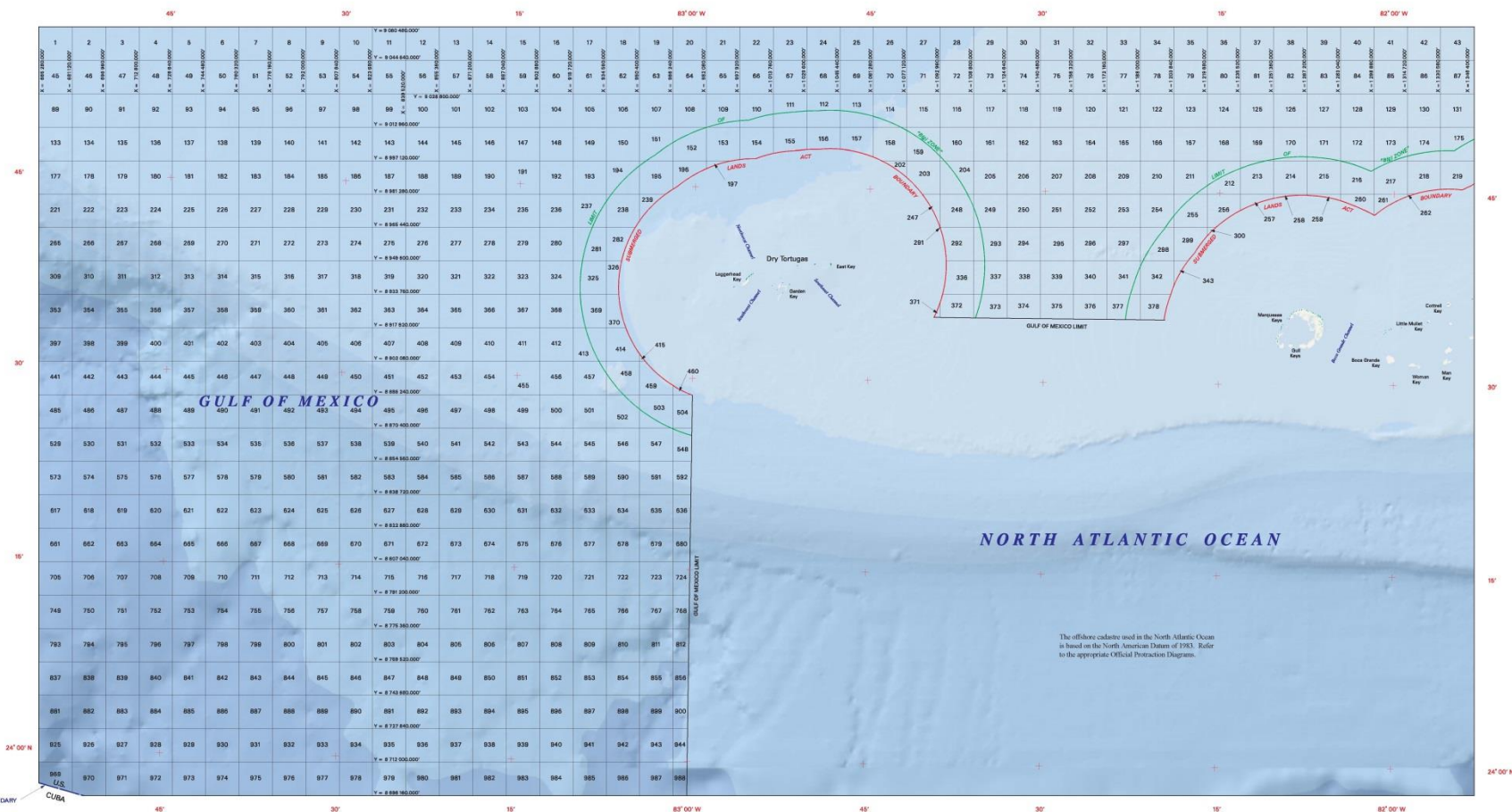
29

Geodatabase for UTM Zone 19N – Atlantic Region



View of Block and Boundary data in the BDS (Beaufort Sea area)





All blocks are based on the Universal Transverse Mercator Grid System, Zone 17, with X origin = 5,845,416.07 feet (550,000 international meters) at 81° West Longitude, and Y origin = 0 feet at 0° Latitude.

Regular blocks are 15,840 feet on a side and contain 5,760 acres. Areas and dimensions of the irregular blocks are as indicated.

Baseline from the 6th Coastal Survey, 1924. The green dots adjacent to the coastal line represent the baseline points used to determine the offshore boundary.

The United States - Cuba Maritime Boundary depicted here is provisional, pending the entry into force of applicable boundary delimitation agreements and, beyond 200 nautical miles, pending the establishment of United States continental shelf jurisdiction, if any.

The Submerged Lands Act Boundary Limit of "Rigg Zone" the U.S. - Cuba Provisional Maritime Boundary, and the boundary line between the North Atlantic Ocean and Gulf of Mexico depicted herein reflect the official federal position for Submerged Lands Act and OCS Lands Act purposes. The areas of the traditional blocks abutting these lines have been determined and are as depicted on the Supplemental Official OCS Block Diagrams (SOBDCs). Consult the SOBDCs for official descriptions and approval dates.

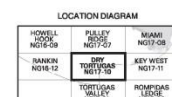
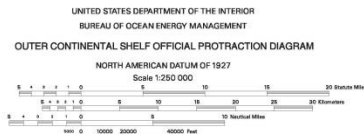
This revised diagram supersedes protraction diagram DRY TORTUGAS NG 17-10, approved 24 OCT 1978, revised 08 APR 1981, and NG 17-10 revised 20 SEP 1995.

Copies of these diagrams and other information may be obtained at the appropriate BOEM OCS region or from <http://www.boem.gov/Maps-and-GIS-Data/>



Subdivision of Blocks
Outer Continental Shelf

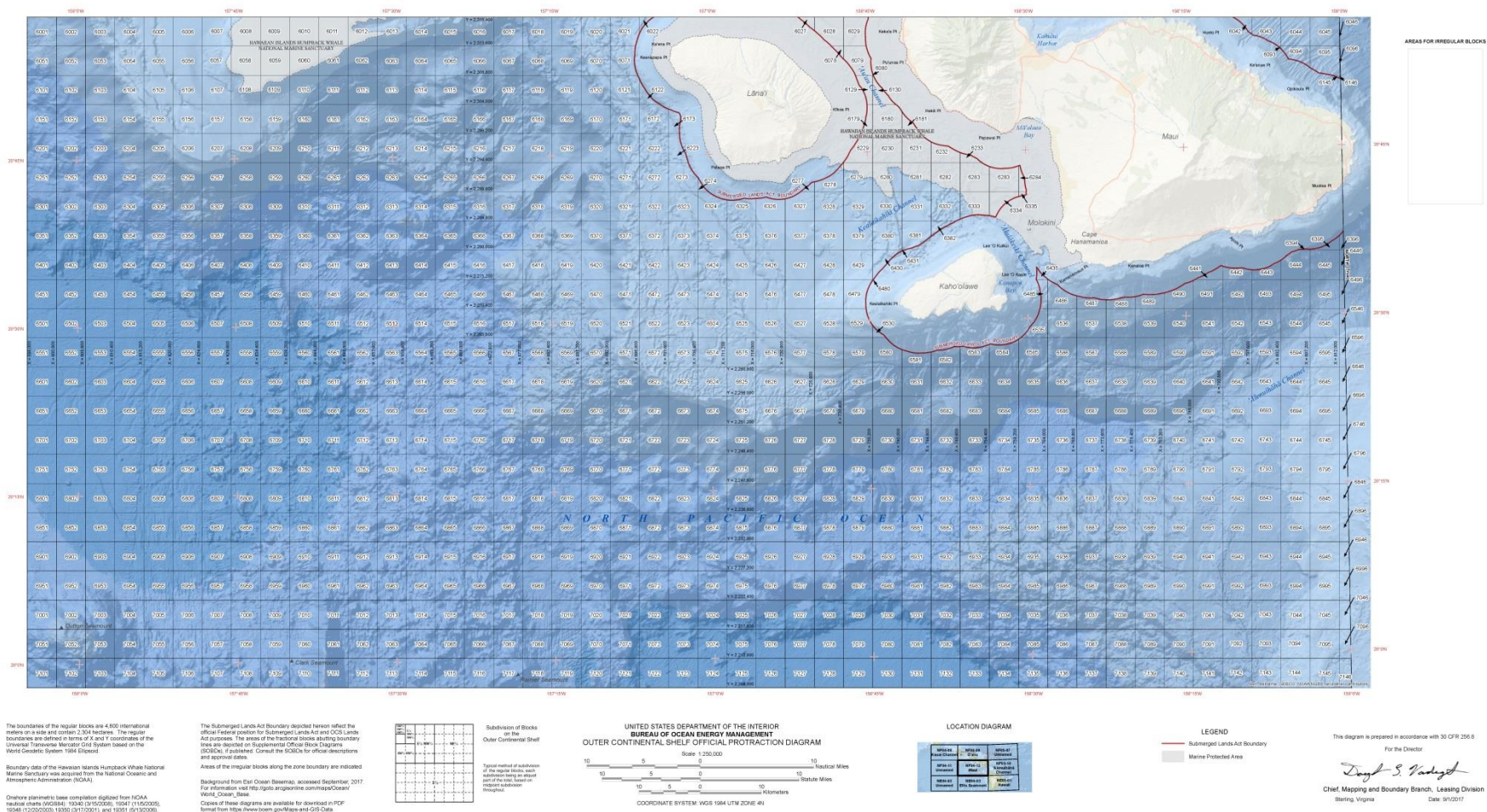
Typical method of application of the Rigg Zone, and part of the 6th Coastal Survey, 1924.



This diagram is prepared in accordance with 30 CFR 556.8 For the Director

Douglas L. Vandegrift
Douglas L. Vandegrift
Chief, Mapping and Boundary Branch, Leasing Division
Hemdon, Virginia Date 01-OCT-2014
Revised

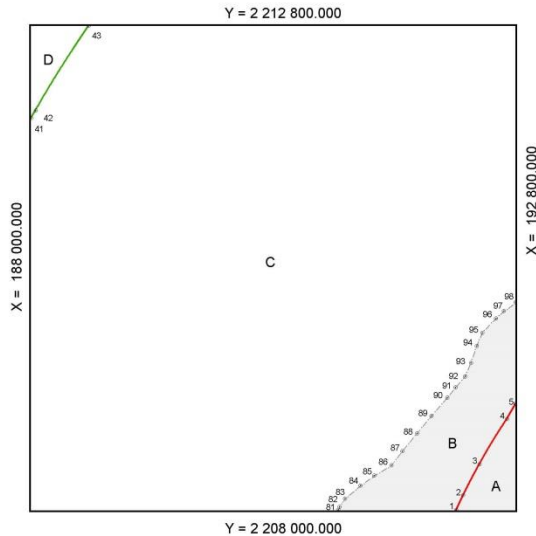
Official Protraction Diagram with Esri Oceans Basemap Dry Tortugas, Florida - 2015



First Official Protraction Diagram for Hawaii: Maui

OCS Planning Area Name Hawaii
OPD Name Alenuihaha Channel
Submerged Lands Act Boundary Radius 5556.000
Limit of "8(g) Zone" Radius 11 112.000

OPD Number NF05-10
Block Number 7102
Datum WGS 84
UTM Zone 5N
Units Meters
Previous SOBD
Signature Date _____



Federal 8(g) Area C = 0000.000000 ha
Federal Non-8(g) Area D = 0000.000000 ha
Sanctuary Area B = 0000.000000 ha
Sanctuary / State Area A = 0000.000000 ha
Total Area 2304.000000 ha

Offshore Intersections		Contributing Baseline Points		Tangent Baseline End Points	
X	Y	X	Y	X	Y
1	239 200.000	3 787 203.183	1-2	239 200.000	3 787 203.183
2	239 200.000	3 787 203.183	2-3	239 200.000	3 787 203.183
3	239 200.000	3 787 203.183			
4	239 200.000	3 787 203.183			
5	239 200.000	3 787 203.183			
41	239 200.000	3 787 203.183			
42	239 200.000	3 787 203.183			
43	239 200.000	3 787 203.183			
81	239 200.000	3 787 203.183			
82	239 200.000	3 787 203.183			
83	239 200.000	3 787 203.183			
84	239 200.000	3 787 203.183			
85	239 200.000	3 787 203.183			
86	239 200.000	3 787 203.183			
87	239 200.000	3 787 203.183			
88	239 200.000	3 787 203.183			
89	239 200.000	3 787 203.183			
90	239 200.000	3 787 203.183			
91	239 200.000	3 787 203.183			
92	239 200.000	3 787 203.183			
93	239 200.000	3 787 203.183			
94	239 200.000	3 787 203.183			
95	239 200.000	3 787 203.183			
96	239 200.000	3 787 203.183			
97	239 200.000	3 787 203.183			
98	239 200.000	3 787 203.183			

* Tangent Segment
— Submerged Lands Act Boundary
— Limit of "8(g) Zone"
□ Marine Protected Area

BOEM prototype: Supplemental Official Block Diagram

For the Director, BOEM _____ Date _____

For HI _____ Date _____

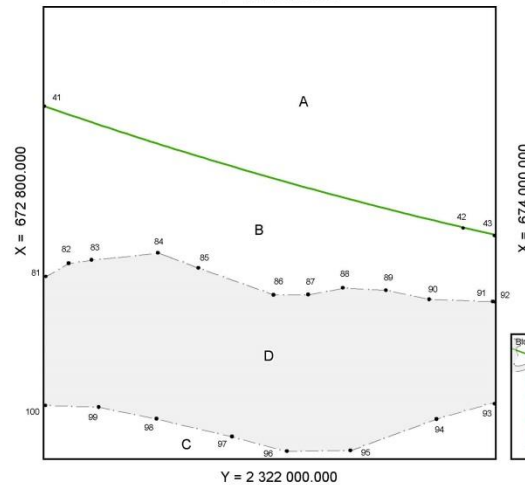
Print Name _____

Print Name _____

OCS Planning Area Name Hawaii
OPD Name Kaiwi Channel

Limit of "8(g) Zone" Radius 11 112.000

Y = 2 323 200.000



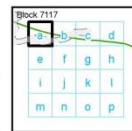
OPD Number NF04-09
Block Number 7117
Aliquot Part a
Datum WGS 84
UTM Zone 4N
Units Meters
Previous SOAD
Signature Date

Federal 8(g) Area A = 52.000001 ha

Federal Non-8(g) Area B = 36.000000 ha
C = 15.000000 ha

Sanctuary Area D = 40.999999 ha

Total Area 144.000000 ha



Offshore Intersections		Contributing Baseline Points		Tangent Baseline End Points	
X	Y	X	Y	X	Y
41	239 200.000	3 787 203.183	41-42	239 200.000	3 787 203.183
42	239 200.000	3 787 203.183	* 42-43	239 200.000	3 787 203.183
43	239 200.000	3 787 203.183			
81	239 200.000	3 787 203.183			
82	239 200.000	3 787 203.183			
83	239 200.000	3 787 203.183			
84	239 200.000	3 787 203.183			
85	239 200.000	3 787 203.183			
86	239 200.000	3 787 203.183			
87	239 200.000	3 787 203.183			
88	239 200.000	3 787 203.183			
89	239 200.000	3 787 203.183			
90	239 200.000	3 787 203.183			
91	239 200.000	3 787 203.183			
92	239 200.000	3 787 203.183			
93	239 200.000	3 787 203.183			
94	239 200.000	3 787 203.183			
95	239 200.000	3 787 203.183			
96	239 200.000	3 787 203.183			
97	239 200.000	3 787 203.183			
98	239 200.000	3 787 203.183			
99	239 200.000	3 787 203.183			
100	239 200.000	3 787 203.183			

* Tangent Segment
— Limit of "8(g) Zone"
Marine Protected Area

BOEM prototype: Supplemental Official Aliquot Diagram

For the Director, BOEM _____ Date _____

Print Name _____

For Hawaii _____ Date _____

Print Name _____

U.S. Offshore Cadastre: Current and Future Mapping

- * **Pacific Region** – Generate OPDs and SOBDs for **Hawaii** and Territories (**Northern Mariana Islands, Guam, and American Samoa**).
- * **Atlantic Region** – Generate OPDs and SOBDs for **Puerto Rico** and the **U.S. Virgin Islands**
- * **Gulf of Mexico Region** – Generate SOBDs for the **U.S. – Mexico maritime boundary** (Transboundary Zone) and the former “**Eastern Gap**”
- * **All Regions** – **update the SLA and 8(g) Zone boundaries** where NOAA has revised the shoreline (MLLW)

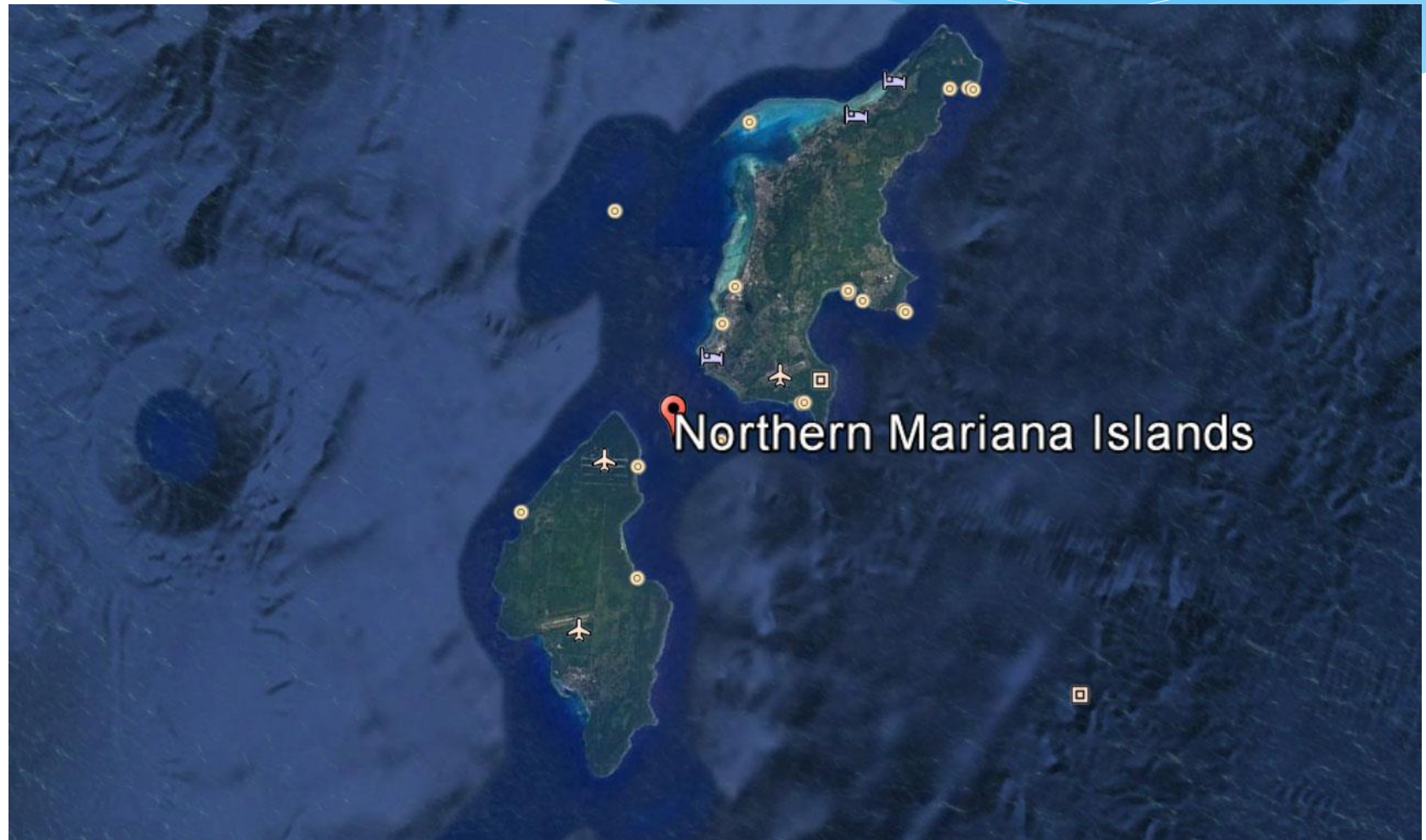
Pacific Territories

BOEM still needs to map



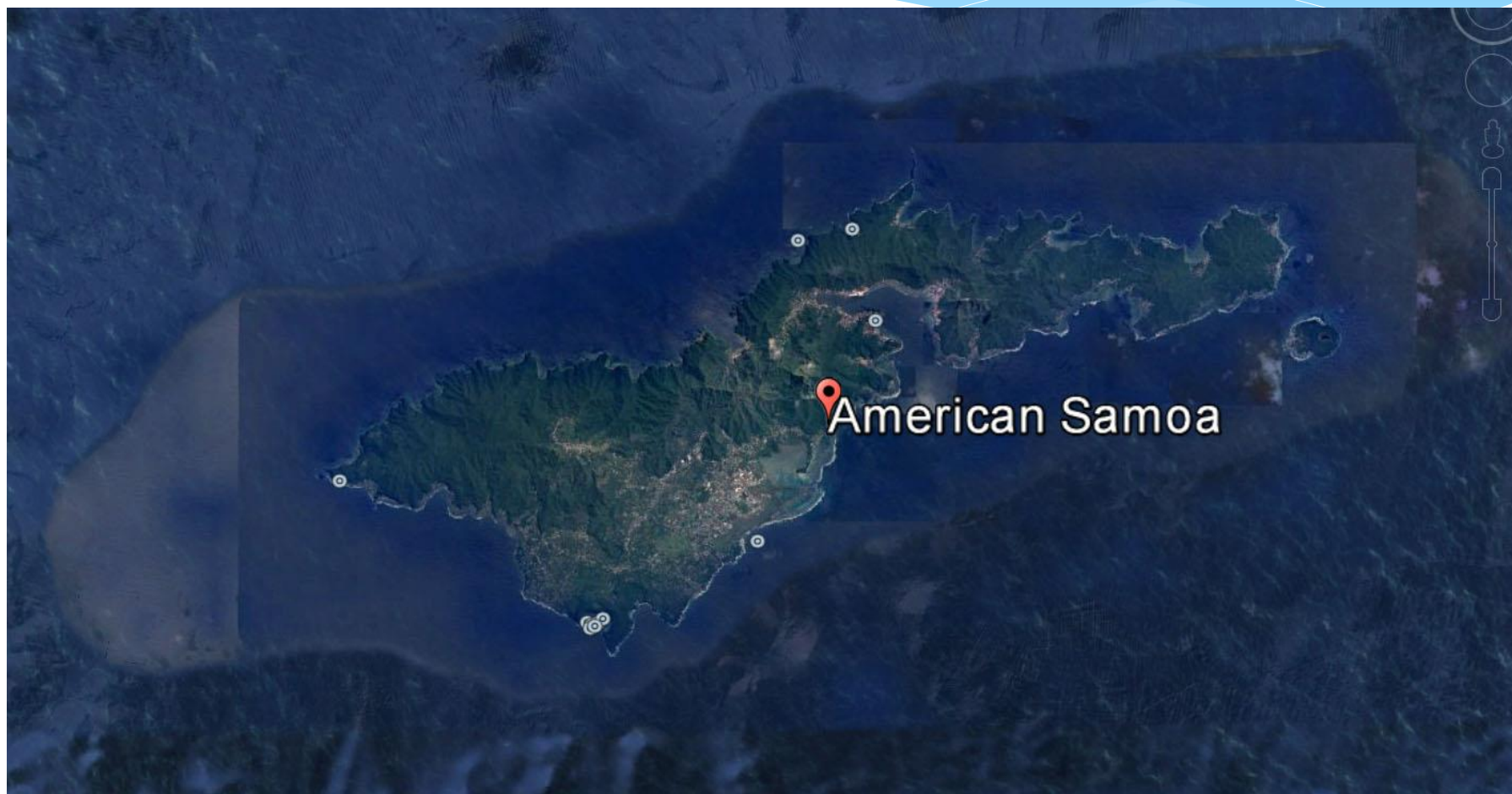
Pacific Territories

BOEM still needs to map



Pacific Territories

BOEM still needs to map



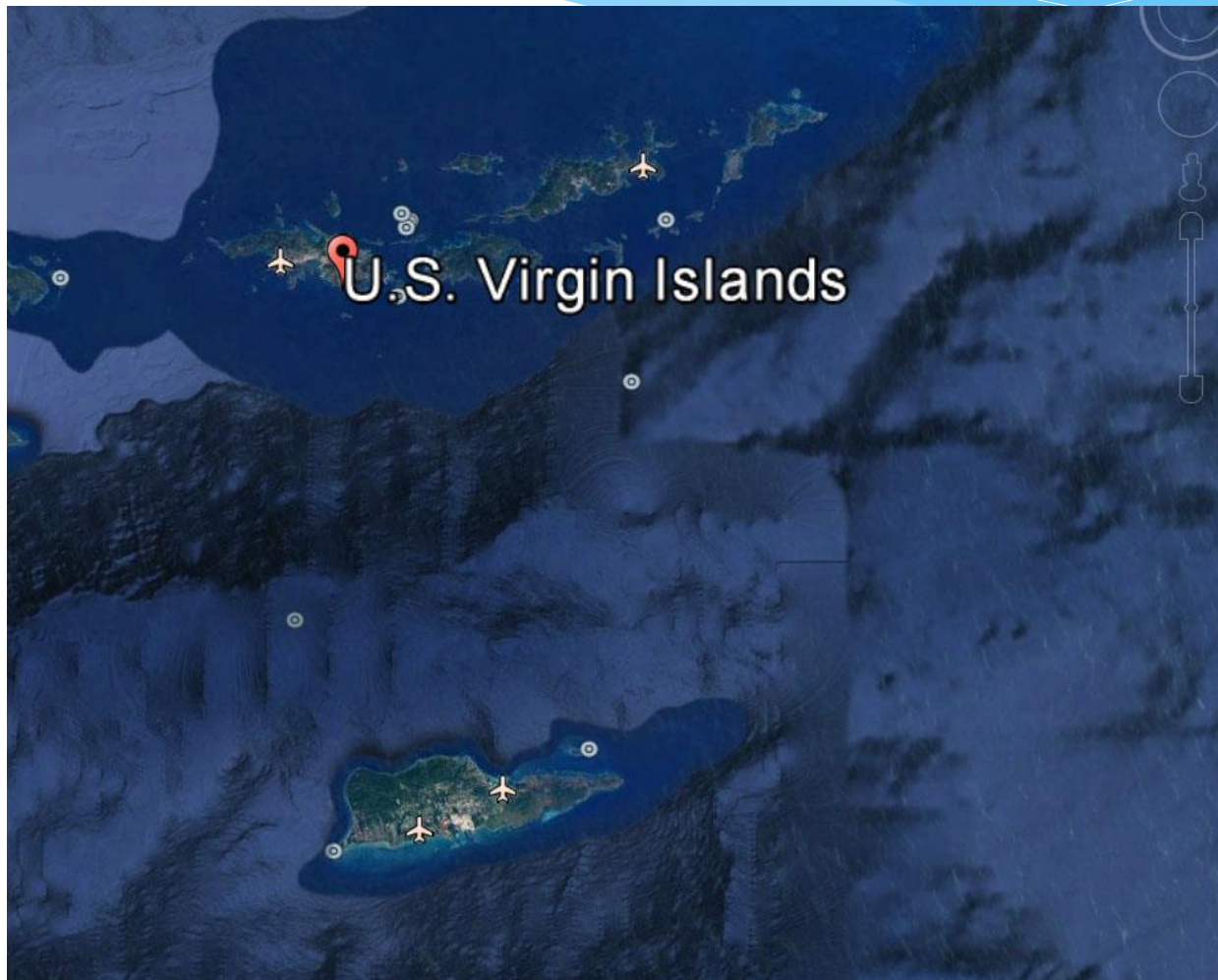
Atlantic Territories

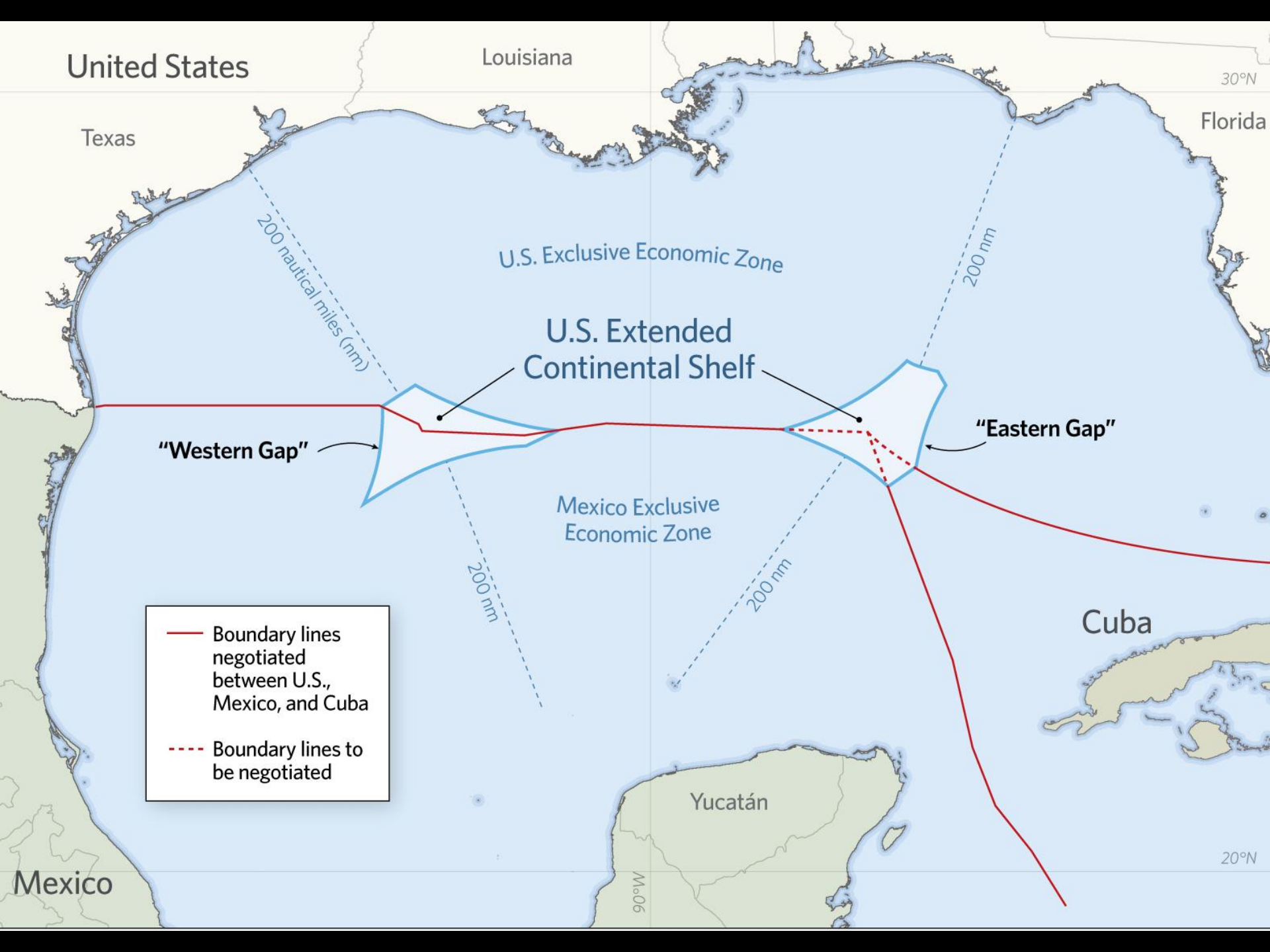
BOEM still needs to map



Atlantic Territories

BOEM still needs to map





Conclusion

- * BOEM now has the databases and tools needed to ***efficiently generate accurate marine boundaries*** and a map production system that will quickly ***provide the products required for energy development*** on the Outer Continental Shelf.
- * Provides a ***long-term solution*** for maintaining the U.S. Offshore Cadastre

Contact:

Doug.Vandegraft@boem.gov

(703) 787-1312

<http://www.boem.gov/Maps-and-GIS-Data/>

<http://marinecadastre.gov/>